A critical appraisal of "Neuromuscular Exercise post Partial Medial Meniscectomy: Randomized Controlled Trial"

By

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Abstract

The purpose of this critical appraisal was done with the intent to analyze the reliability and validity of “Neuromuscular Exercise post Partial Medial Meniscectomy: Randomized Controlled Trial”. This article best answered the question, does neuromuscular exercise decrease the likelihood of developing knee osteoarthritis post meniscectomy? While doing so this critical appraisal the introduction, methods, results, and discussion were examined for any flaws and inconsistencies. The introduction and discussion were clear and direct while the methods and results had some inconsistent findings. The article recognized the limitations that presented themselves and advised various alterations to be made if someone wished to pursue this topic further. Other outcome measures were suggested as it was believed they could provide more of an insight and the potential benefits of neuromuscular exercise. This was a strength of the article as it recognized the issues with the study instead of making false claims. As of right now, this intervention would not be an ideal treatment plan for decreasing the risks of developing knee osteoarthritis.

Key words

Knee, neuromuscular exercise, osteoarthritis, meniscectomy, significance,

Introduction

Osteoarthritis is prevalent among older adults who have had surgical procedures performed on the knee. Among those procedures meniscectomies are some of the most common. In these individuals knee osteoarthritis frequently develops post meniscectomy. Many interventions have been explored in terms of preventing this development. Neuromuscular exercise is one of the interventions that has been further investigated in some studies. It proposes the question, does neuromuscular exercise decrease the likelihood of developing knee osteoarthritis post meniscectomy?

Methods

In order to find an article to answer this question a research process needed to be started. The process started with using search engines such as Pubmed, SPORTDiscus w/ full text, and Rehabilitation & Sports Medicine Source. During the search keywords that were utilized in finding articles included meniscus, meniscus tear, neuromuscular exercise, meniscectomy, and rehabilitation. In order to narrow down the number of articles to sort through, the search was limited to articles in the last 10 years in order to keep the articles fairly recent. Another limitation that occurred due to time and financial constraints was filtering the articles by which ones provided a free full text, this ensured the articles were easily accessible. While sorting through the articles certain criteria needed to be met in order for it to be considered for this review. The article could not be a systemic review, discuss meniscectomies due to previous ACL injury, and needed to have an emphasis on neuromuscular exercise as an intervention. This criterion allowed for the search to focus on meniscectomies that were necessary solely because of meniscus injuries that could lead to knee osteoarthritis. This also meant that only articles centered on

neuromuscular exercise would be considered. Based off of all these factors a total of 132 articles were found collectively.

Ultimately the research article chosen for this review was one conducted in Melbourne, Australia and published in the American College of Sport Medicine. The authors of this study come from various backgrounds and have vast experience in their respective fields. The article had a solid foundation as to why neuromuscular exercise could possibly decrease prevalence of knee osteoarthritis. The authors also had competent physiotherapists to provide the neuromuscular exercises to the individuals. The experimental group participated in the ALIGN exercise protocol and the control group did not do any exercise. Overall, 62 people participated in the study which made the results more reliable and applicable to the general population.

Results

Summary of the study

The purpose of this study was to evaluate the effects of neuromuscular exercise on delaying osteoarthritis of the knee in individuals that had an arthroscopic partial meniscectomy procedure. The group of focus for this study were individuals who were considered middle-age as opposed to those that were younger with the same procedure. The knee external adduction moment (KAM) was used as the main measurement throughout the study as it related to the mechanical factors of gait. A decrease in KAM was thought to reduce the incidence of knee osteoarthritis. Participants went through a 12-week neuromuscular exercise regime, known as ALIGN, with the guidance of seven physiotherapists. During those weeks the participants did six exercises that focused on the lower limb and trunk engagement while performing functional tasks. The six exercises chosen were selected due to previous reports of “improved cartilage quality and physical function” in individuals having gone through a meniscectomy. Each individual was analyzed while performing three movements: walking (normal and fast paced), a one leg sit-to-stand, and one leg hop for maximum distance. Among these measurements self-reported pain and physical function, muscle strength, and physical performance tasks were also monitored during the 12 weeks. The study found that there was no significant difference between

the experimental and controlled groups in terms of changes in KAM in walking (normal and fast paced) or in the one leg sit-to-stand. There was no mention of the significance of one leg hop for maximum distance.

Appraisal of the study introduction

The introduction was thorough in providing details as to why this study was conducted. There is not any information that appeared to be missing from their reasoning. The purpose of this study was to look at the effectiveness of a 12-week neuromuscular program on individuals having undergone an arthroscopic partial meniscectomy. This study specifically looked at walking and a one-leg sit-to-stand. The author uses various sources to create a sound rationale that supported their reasoning. The critical variables have been mentioned a sufficient amount throughout the introduction. It was clear that the independent variable is neuromuscular exercise and dependent variables were peak knee adduction moment in normal-paced walking and one-leg sit-to-stand.

The introduction is well written and precise in what the aim of the study is and the reasoning behind it. Nothing stood out as a potential weakness in the introduction.

Appraisal of the study methods

The study is an experimental, randomized controlled trial. It is prospective, longitudinal, and single blinded. There were 62 participants in the study with only two individuals withdrew due to moving out of the country and time commitments. Both participants were from the control group therefore it is not believed to have had any impact on the results of the study. This study was a between-subject design with an experimental and a controlled group. The group assignments were concealed from the researchers enrolling the subjects into the study. This study also utilized assessors that were blinded to the group assignments but did not blind the subjects. The subjects did not know the hypothesis of the study however. The two groups were similar in all aspects at the start of the study and were managed the same way except for the experimental

intervention. The outcome measures involved three-dimensional movement analysis, physical tests, isokinetic dynamometer, Kellgren-Lawrence grading system, and Knee Injury Osteoarthritis Outcome Score. Reliability and validity were only mentioned with the three-dimensional movement analysis and the Knee Injury Osteoarthritis Outcome Score. Both of which had support from appropriate resources. The data collection was described in enough detail for others to replicate in the future. There were two statistical analyses used. ANCOVA was used to compare between groups and Pearson chi test was used to compare medication use and cointervention between groups. These were both appropriate for the data being analyzed.

The intervention is not clearly described in this study. It mentions the ALIGN exercise program but, refers to other literature in order to obtain those details. If someone wanted to replicate this study, they would have to find the article describing the ALIGN exercise program. They provide a link for the exercise program but as time progresses the program might update and be different from the one used in this study.

Appraisal of the study results

The results are written in order of the research questions in a clear manner. The results address each hypothesis of the study. Theis study operated with a confidence interval is 95% and a p value of 0.05. The statistically significant results were an improvement in physical function and overall improvement when compared to the control.

The authors mentioned all of the outcome measures in their results except for the muscle strength outcomes. There was no mention of the results of the muscle strength tests or their significance. However, they were included in Table 3. Only Table 3 is a bit difficult to read given it is landscape format but it is understandable with all the data presented on the table. It was noted that Table 3 does not

match with the claims that the improvement in physical function and overall improvement were significant. There is an inconsistency between the data tables and the claims made.

Appraisal of the study discussion

The authors gave explanations as to possible reasons as to why their findings were not significant. They also provided details as to why they focused on these particular outcome measures. The authors used a plentiful amount of recent literature from credible journals and related it to their findings. The conclusion was reflective of the results and provided insight for future studies. A future study looking into long term impact of neuromuscular exercise is suggested. It was encouraged that measurements of structural cartilage of osteoarthritis be taken at onset and as it progresses in any impending studies. The study should also look at the impact of task-specific protocols before the neuromuscular exercise. The authors stated that this study reinforced that exercise does not affect KAM in individuals with knee osteoarthritis.

There are a few limitations of the study mentioned. The peak KAM is often used due to the ability to determine "structural cartilage change" and this study did not measure that. Another limitation is that a small percentage of the participates were at risk of developing osteoarthritis in the knee. This requires an overall generalization for individuals at risk. The participants were also not blinded to the study and puts the credibility of the study up for question. And lastly, there was no monitoring of how well the physiotherapists followed the ALIGN protocol.

Discussion

Had this study found significance between the experimental and controlled group it could have solidified a possible plan of care for all individuals participating in physical therapy following a meniscectomy. While this study was not successful in proving the significance of

neuromuscular training on preventing/delaying knee osteoarthritis it did give insight on alternative outcome measures to focus on for future research.

Based on this study neuromuscular exercise would not be recommended in terms of reducing the risks of developing knee osteoarthritis post meniscectomy. The outcome measures indicate that neuromuscular exercise had no significant impact when compared to no exercise at all. In fact, there were some adverse effects in some subjects while participating in the study. While some the subjects in the experimental group reported improvement in pain and physical function, almost half of them reported increases in knee and back pain. Pain is often a deterrent for many individuals when it comes to exercise. Seeing as there are no proven benefits, outside of possible improvement in physical function, it would not be an optimal intervention to use for post meniscectomy patients.

There is not enough confidence in this paper in order to consider using this intervention on a future patient/client. This paper showed that neuromuscular exercise does not significantly reduce a patient's potential to reduce the likelihood of developing osteoarthritis in the knee. If the authors of the study had proven their hypothesis to be true then implementing neuromuscular exercise in a patient's rehabilitation program would be tremendously beneficial. Teaching a patient an exercise is centered around making sure the exercise is done with the proper body mechanics and the patient is aware of the reasons for doing so. Neuromuscular exercises could be executed safely and appropriately in the right circumstances.

This study was conducted in a well-organized manner that made it easy to follow and understand. It could be replicated fairly easily, more so if the ALIGN protocols were included in the article. Unfortunately, the hypothesis was not proven to be true but it shows room for improvement in future research. This article recognized their limitations and suggests various

ways to move forward with research of this intervention in terms of preventing the development of knee osteoarthritis in post meniscectomy patients.